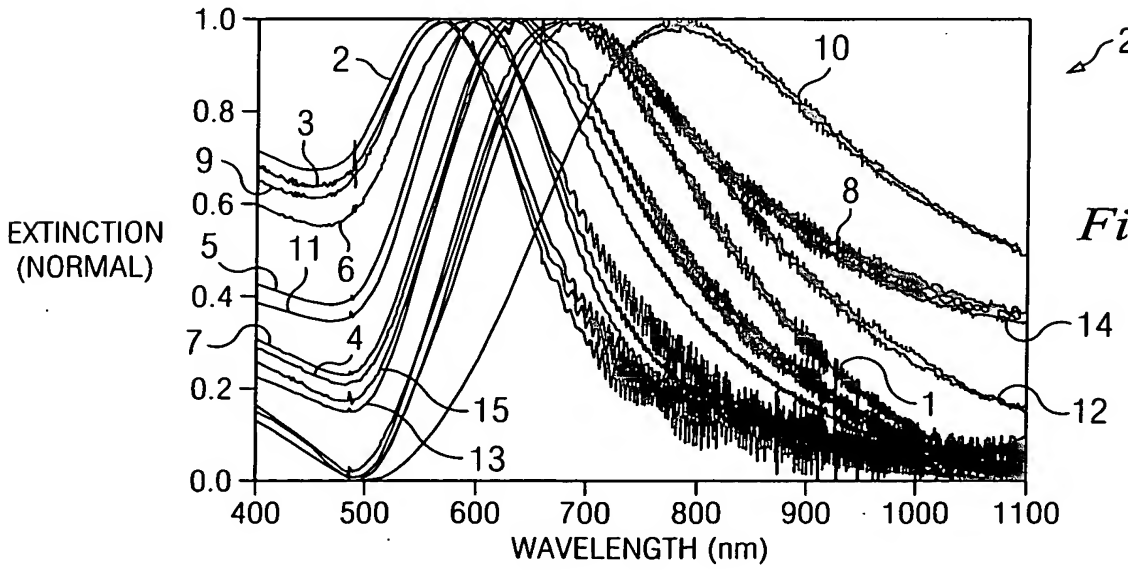
SAMPLE	SUBSTRATE TEMPERATURE (°C)	DEPOSITION RATE (Å/s)	FILM THICKNESS (Å)	SPRW (nm)
1	31	0.3	30	649
2	120	0.3	30	601
3	31	1.2	30	671
4	75.5	0.75	30	615
5	75.5	1.2	50	654
6	75.5	0.75	30	623
7	120	0.75	50	620
8	31	0.75	50	716
9	75.5	1.2	10	572
10	75.5	0.75	30	614
11	120	0.75	10	552
12	75.5	0.3	50	650
13	75.5	0.3	10	658
14	120	1.2	30	602
15	31	0.75	10	582

100

Fig. 1



200

Fig. 2

Fig. 3A

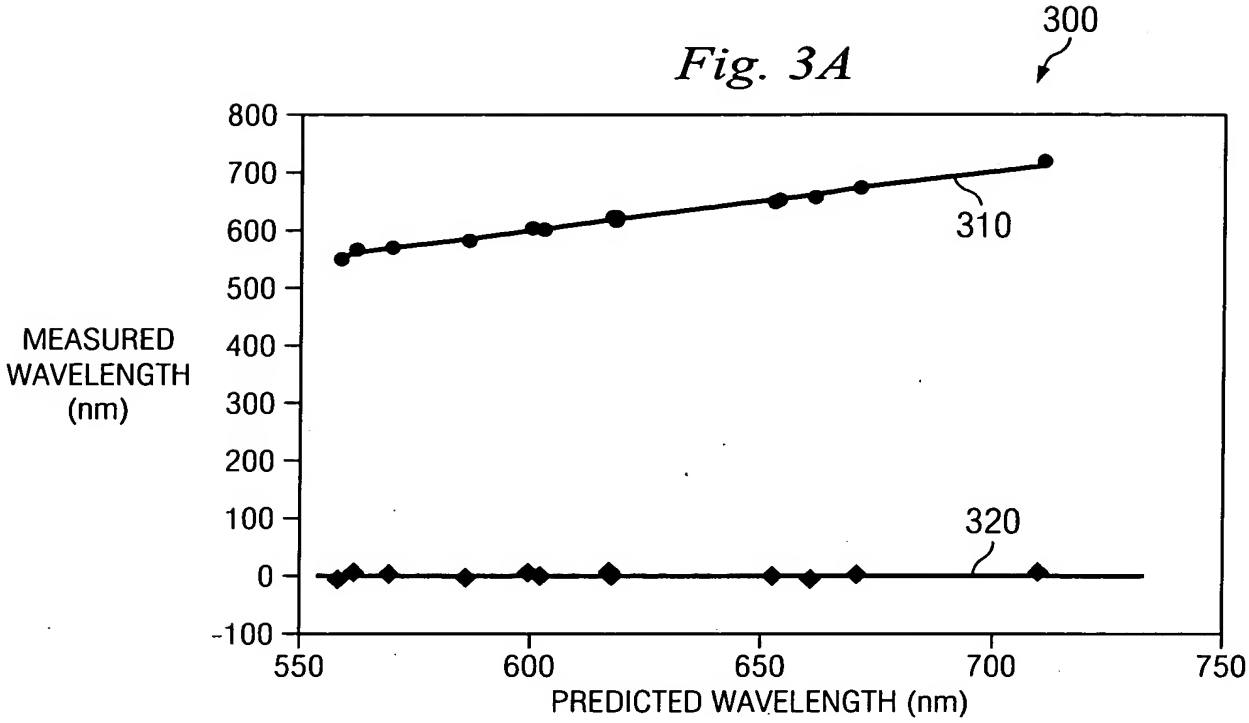

300
800
700
600
500
400
300
200
100
0
-100
MEASURED
WAVELENGTH
(nm)
310
320
550
600
650
700
750
PREDICTED WAVELENGTH (nm)

Fig. 3B

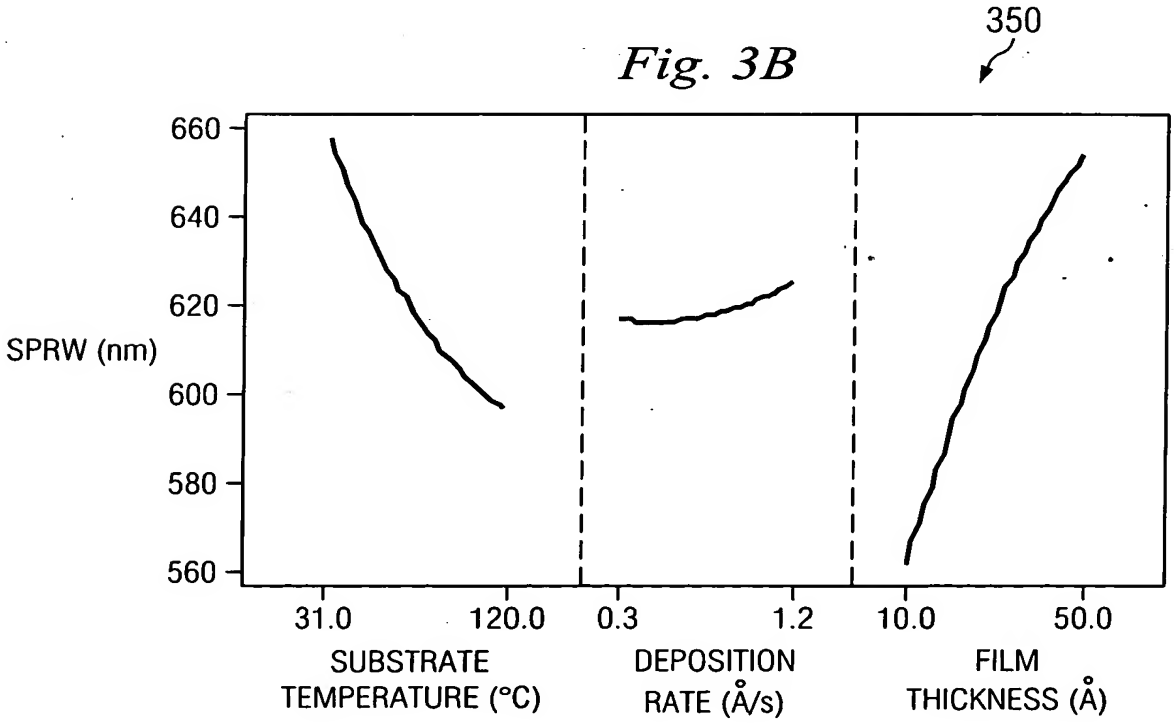

350
660
640
620
600
580
560
SPRW (nm)
31.0
120.0
0.3
1.2
10.0
50.0
SUBSTRATE
TEMPERATURE (°C)
DEPOSITION
RATE (Å/s)
FILM
THICKNESS (Å)

Fig. 4A

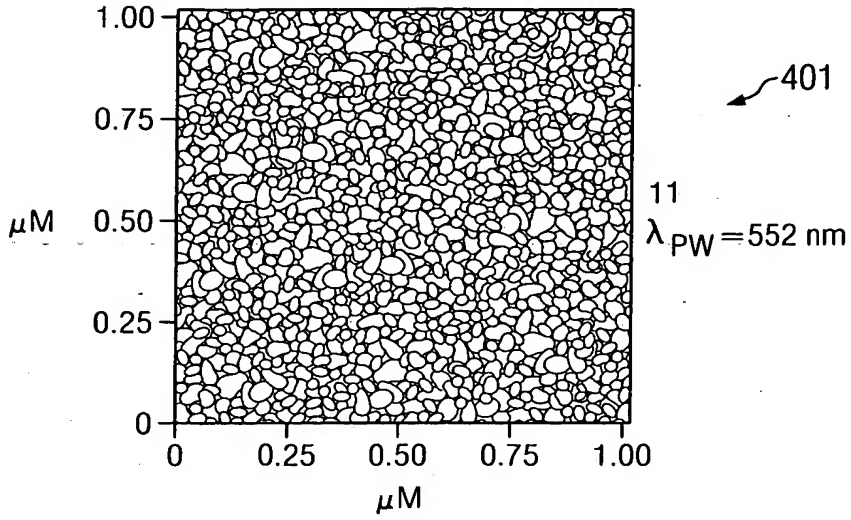


Fig. 4B

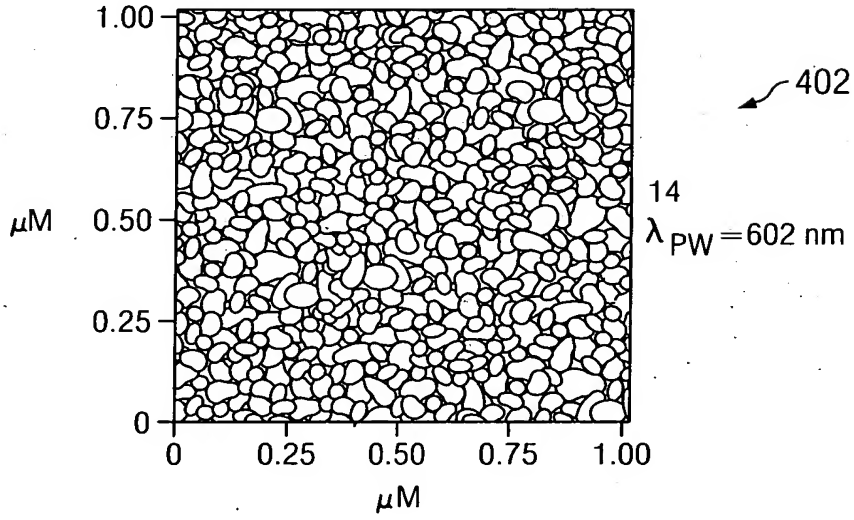


Fig. 4C

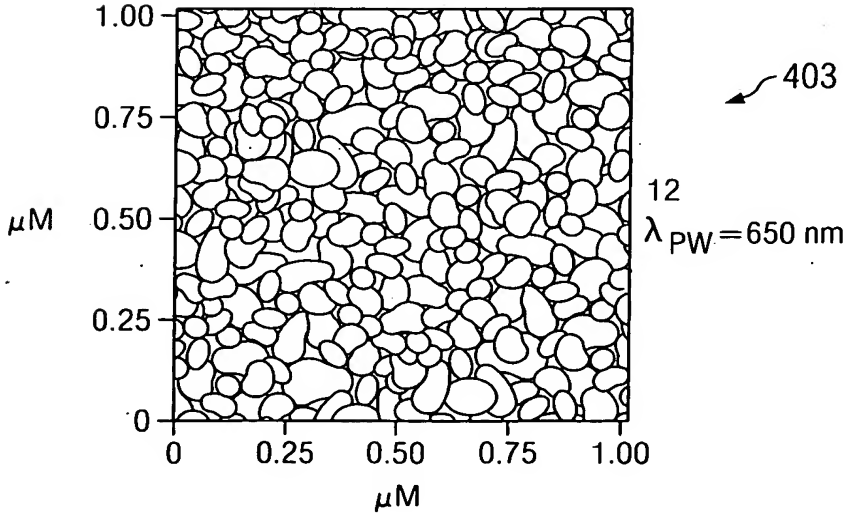


Fig. 5A

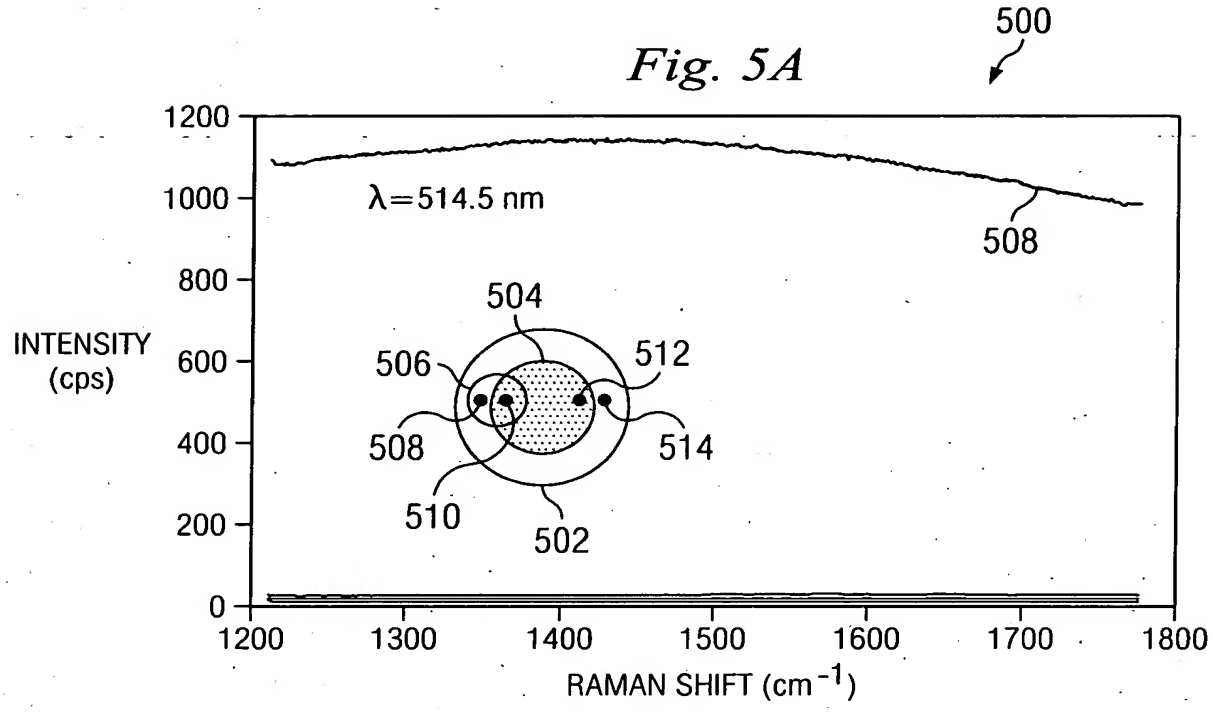

500
1200
1000
800
600
400
200
0
INTENSITY
(cps)
λ=514.5 nm
508
504
506
512
508
514
510
502
1200
1300
1400
1500
1600
1700
1800
RAMAN SHIFT (cm^{-1})

Fig. 5B

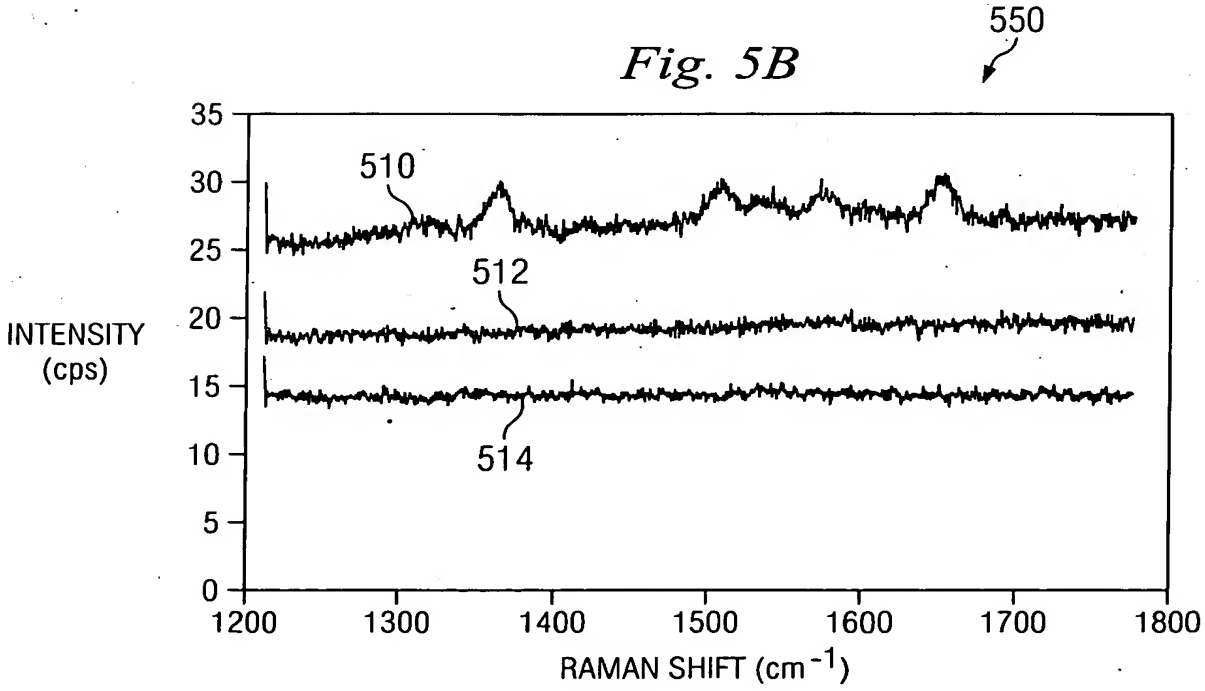

550
35
30
25
20
15
10
5
0
INTENSITY
(cps)
510
512
514
1200
1300
1400
1500
1600
1700
1800
RAMAN SHIFT (cm^{-1})

Fig. 6A

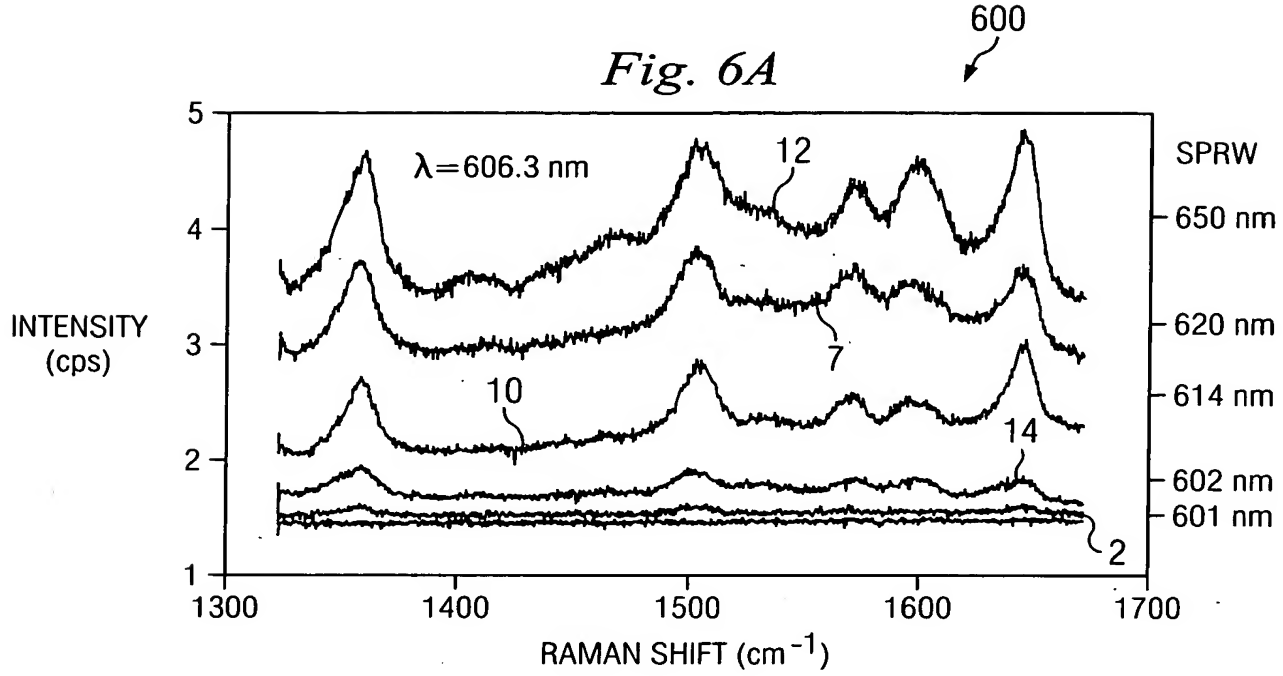

600
λ=606.3 nm
12
7
10
14
2
SPRW
650 nm
620 nm
614 nm
602 nm
601 nm
INTENSITY
(cps)
5
4
3
2
1
1300
1400
1500
1600
1700
RAMAN SHIFT (cm^{-1})

Fig. 6B

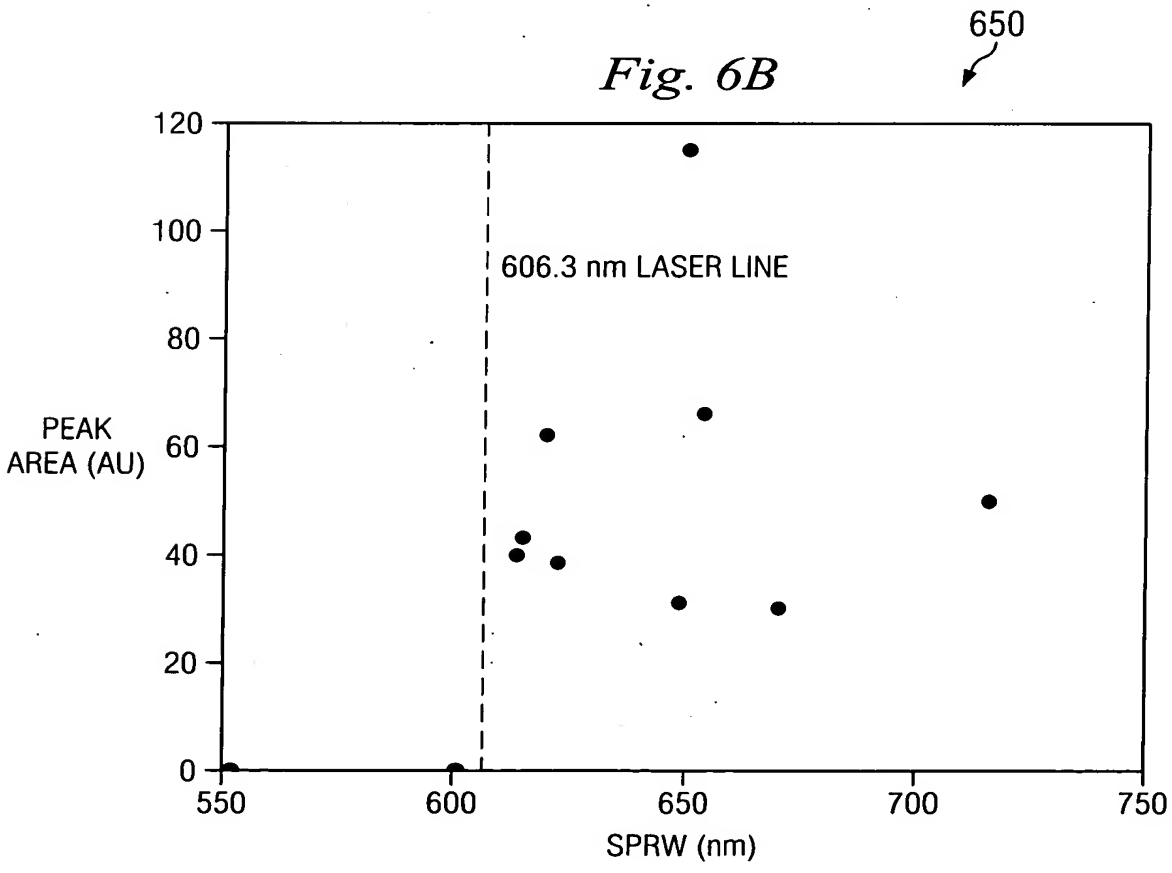

650
606.3 nm LASER LINE
PEAK
AREA (AU)
120
100
80
60
40
20
0
550
600
650
700
750
SPRW (nm)

Fig. 7

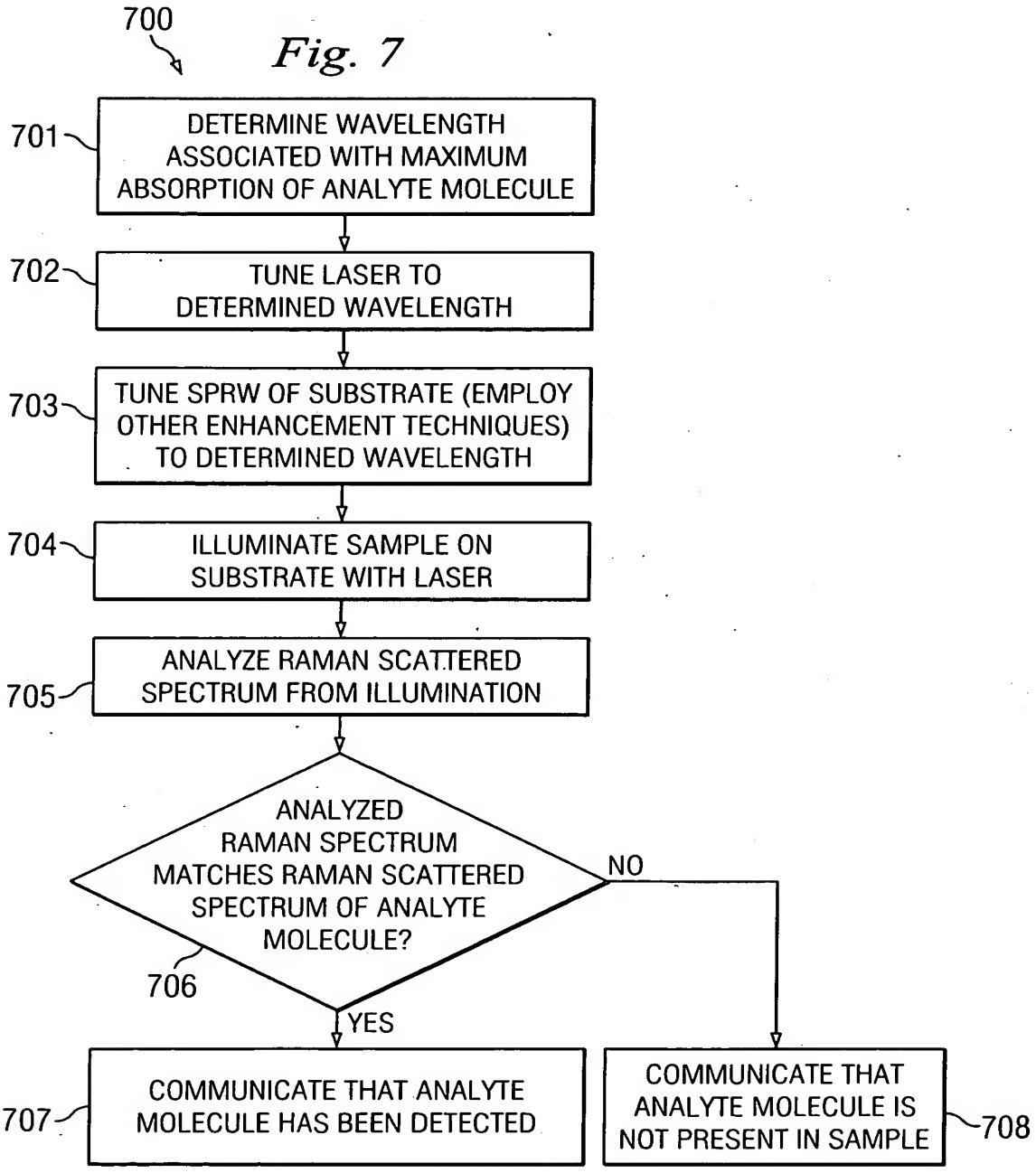

700
701
DETERMINE WAVELENGTH ASSOCIATED WITH MAXIMUM ABSORPTION OF ANALYTE MOLECULE
702
TUNE LASER TO DETERMINED WAVELENGTH
703
TUNE SPRW OF SUBSTRATE (EMPLOY OTHER ENHANCEMENT TECHNIQUES) TO DETERMINED WAVELENGTH
704
ILLUMINATE SAMPLE ON SUBSTRATE WITH LASER
705
ANALYZE RAMAN SCATTERED SPECTRUM FROM ILLUMINATION
ANALYZED RAMAN SPECTRUM MATCHES RAMAN SCATTERED SPECTRUM OF ANALYTE MOLECULE?
706
NO
YES
707
COMMUNICATE THAT ANALYTE MOLECULE HAS BEEN DETECTED
COMMUNICATE THAT ANALYTE MOLECULE IS NOT PRESENT IN SAMPLE
708

Fig. 8

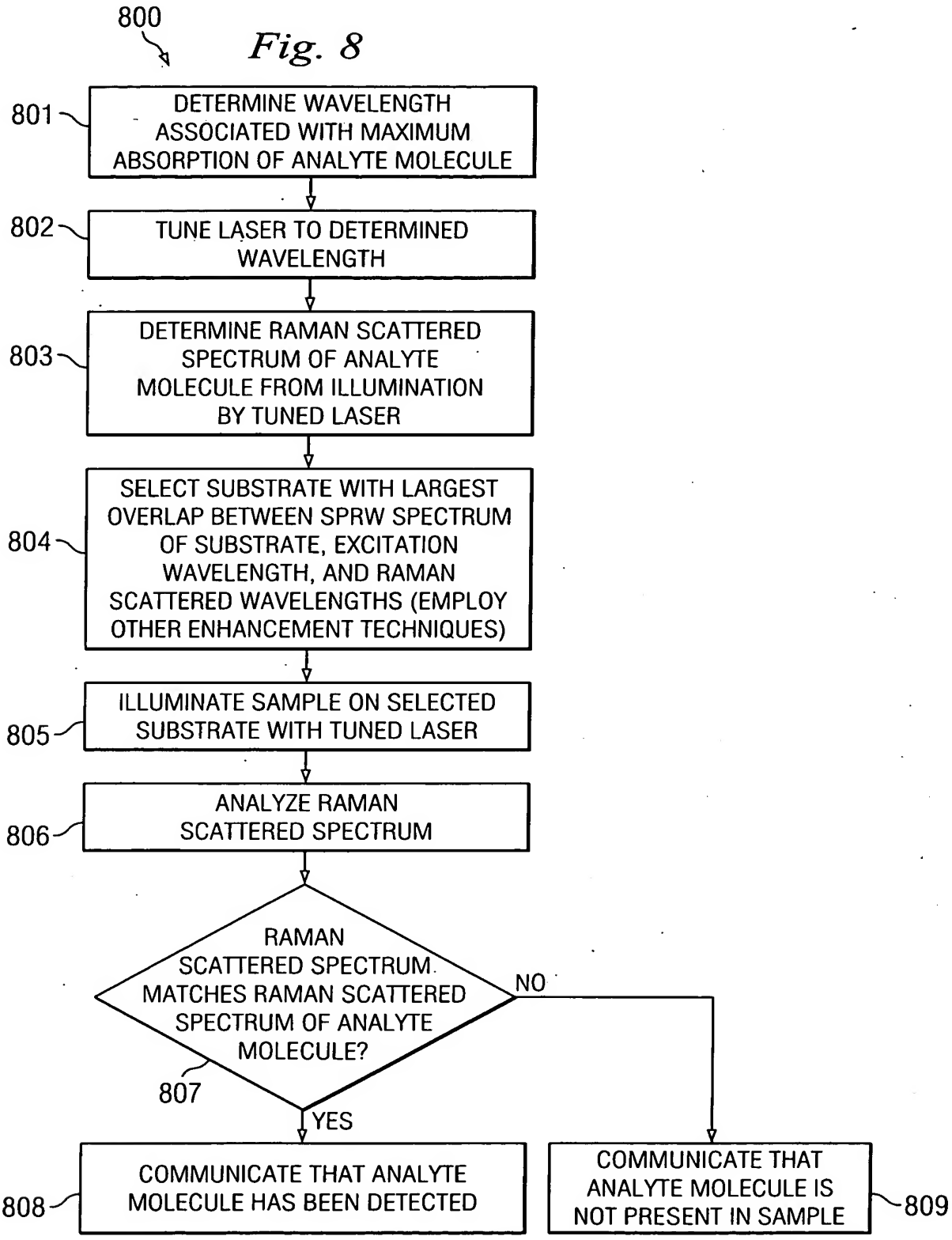
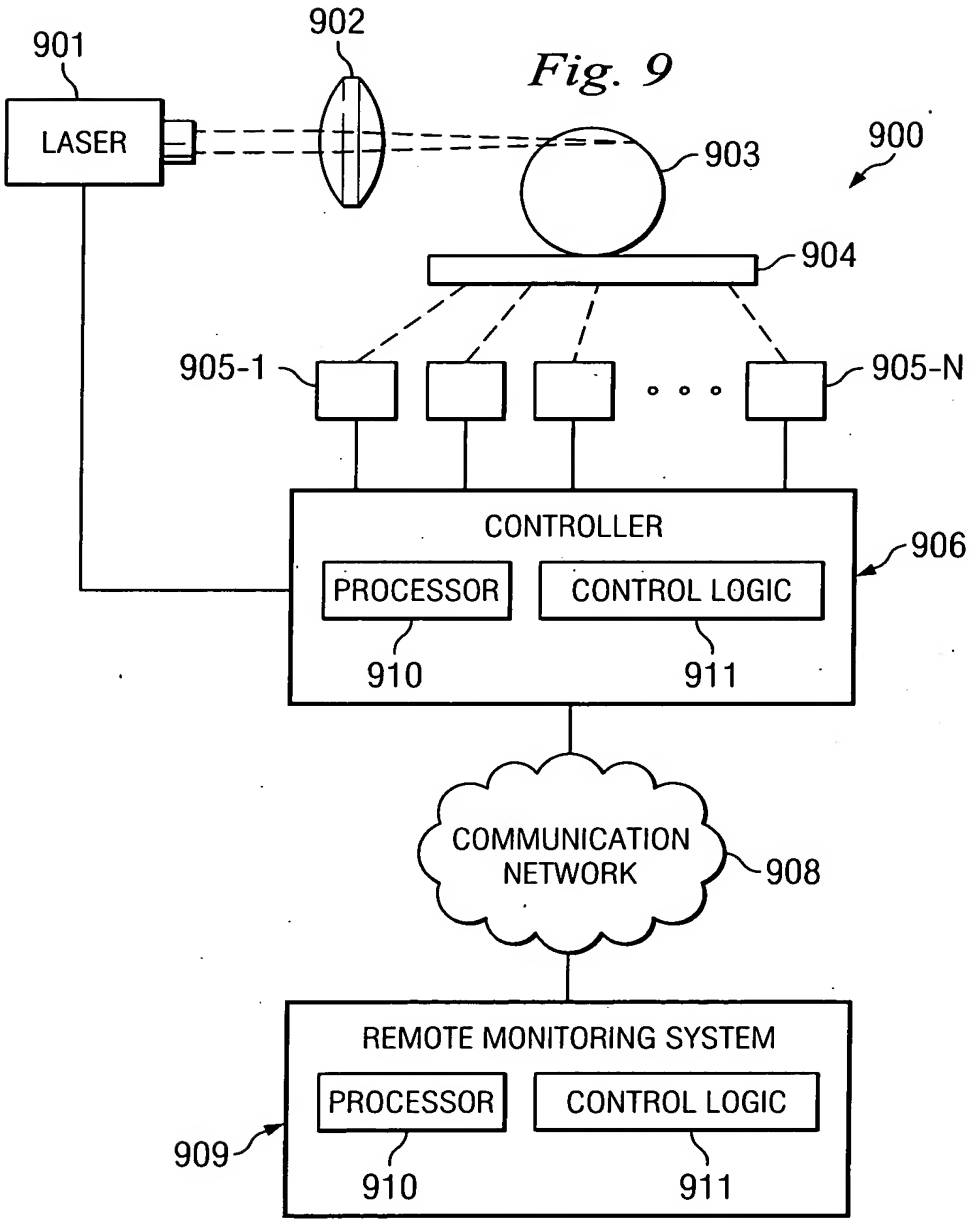

800
801
DETERMINE WAVELENGTH ASSOCIATED WITH MAXIMUM ABSORPTION OF ANALYTE MOLECULE
802
TUNE LASER TO DETERMINED WAVELENGTH
803
DETERMINE RAMAN SCATTERED SPECTRUM OF ANALYTE MOLECULE FROM ILLUMINATION BY TUNED LASER
804
SELECT SUBSTRATE WITH LARGEST OVERLAP BETWEEN SPRW SPECTRUM OF SUBSTRATE, EXCITATION WAVELENGTH, AND RAMAN SCATTERED WAVELENGTHS (EMPLOY OTHER ENHANCEMENT TECHNIQUES)
805
ILLUMINATE SAMPLE ON SELECTED SUBSTRATE WITH TUNED LASER
806
ANALYZE RAMAN SCATTERED SPECTRUM
RAMAN SCATTERED SPECTRUM MATCHES RAMAN SCATTERED SPECTRUM OF ANALYTE MOLECULE?
807
NO
YES
808
COMMUNICATE THAT ANALYTE MOLECULE HAS BEEN DETECTED
COMMUNICATE THAT ANALYTE MOLECULE IS NOT PRESENT IN SAMPLE
809

Fig. 9


901
902
LASER
903
900
904
905-1
905-N
CONTROLLER
906
PROCESSOR
CONTROL LOGIC
910
911
COMMUNICATION
NETWORK
908
REMOTE MONITORING SYSTEM
PROCESSOR
CONTROL LOGIC
909
910
911